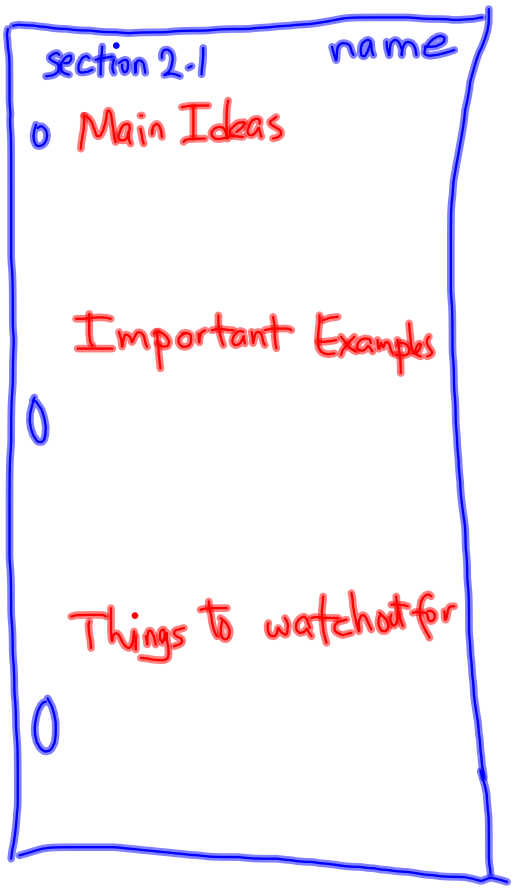
2.6 limits of trig functions 2014-09-24 day 21



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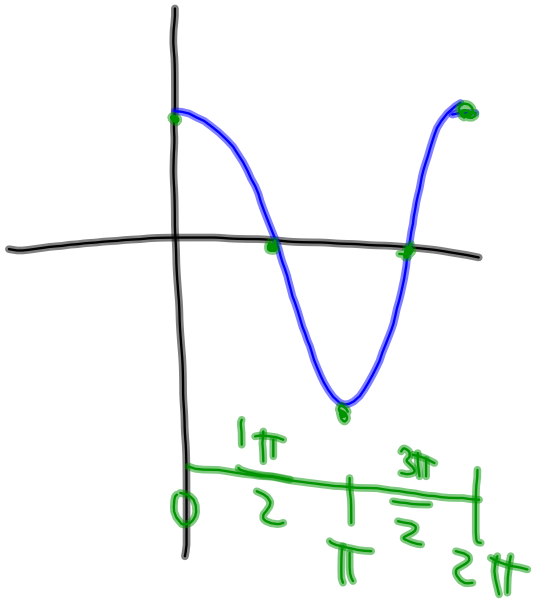
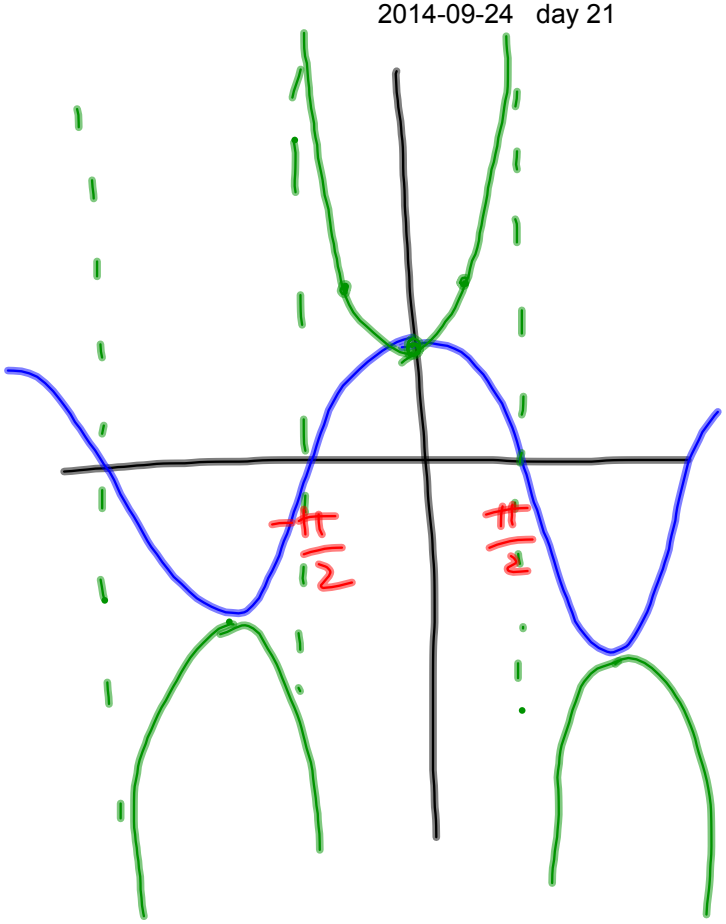
4) $\sec x = \frac{1}{\cos x}$





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inverse "function opposite" → composition

$a^{-1} = \frac{1}{a}$ reciprocal

multiplication ✗ division

If $a(x)$ is a function, THOUGH,

$a^{-1}(x)$ is the inverse of x.

i.e. $a(a^{-1}(x)) = x$; and

$a^{-1}(a(x)) = x$ for every x in the respective domains

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$\sin^{-1}(x) \equiv$ "the angle whose sine is x"

θ .... property $\sin(\theta) = x$

domain $[-1, 1]$

$\sin^{-1}(0) = 0$ because $\sin(0) = 0$

$\sin^{-1}(1) = \frac{\pi}{2}$ because $\sin(\frac{\pi}{2}) = 1$

$\sin^{-1}(2) =$ error - DOMAIN

$\sin^{-1}(3) =$

because there is no θ with $\sin(\theta) = 2$

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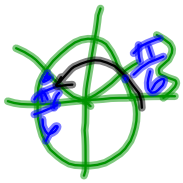
$\sin x$ = y-coordinate on unit circle



$\sin\left(\frac{\pi}{6}\right)=\frac{1}{2}$

$\pi-\frac{\pi}{6}=\frac{5\pi}{6}$

$\sin\left(\frac{5\pi}{6}\right)=\frac{1}{2}$

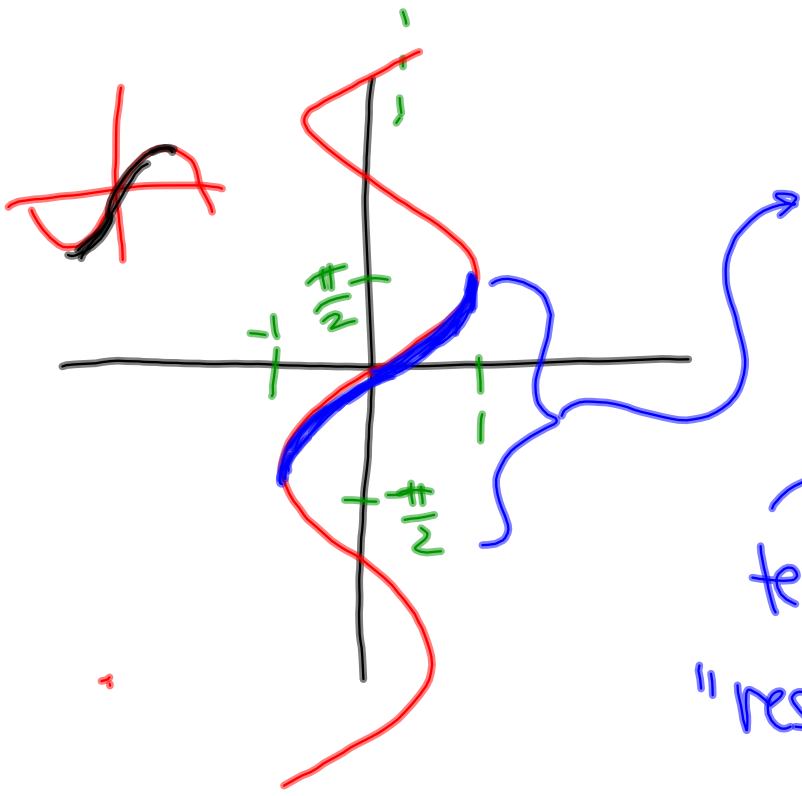
$2\pi-\frac{2\pi}{6}$

$\sin\left(\frac{13\pi}{6}\right)=\frac{1}{2}$

$\sin\left(\frac{17\pi}{6}\right)=\frac{1}{2}$

$\sin^{-1}\left(\frac{1}{2}\right)=?$ $\frac{\pi}{6}$? $\frac{5\pi}{6}$? $\frac{13\pi}{6}$? $\frac{17\pi}{6}$? ...

we want $\sin^{-1}(x)$ to be a function



"principal" $\sin^{-1}(x)$ $=\mathrm{Sin}^{-1}(x)$

technique of "restricting the domain"

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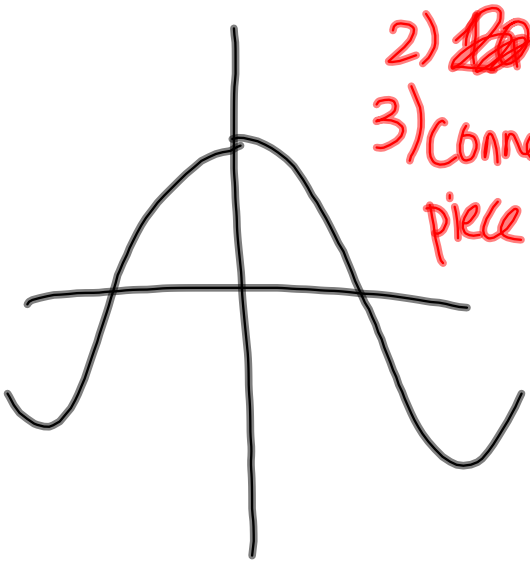
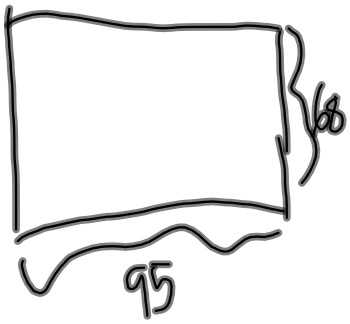
1) fn)

2) ~~Q1~~

3) connected piece





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θ

$\sec^{-1}(x) = \frac{1}{\sec(\theta)} = \frac{1}{x}$ $\sec(\theta) = x$

"the angle whose secant is x"

$\cos\theta$

NO

BIN

"Mr. Wilder, I know! I know!"

"$\sec^{-1}(x) = \frac{1}{\cos^{-1}(x)}$"

$\equiv$ "the angle whose cosine is $\frac{1}{x}$".

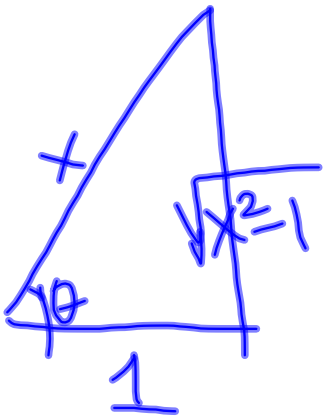
$\sec^{-1}(x)$ is the angle (θ) whose secant is x.

ly

$\sec(\theta) = x$

I also know

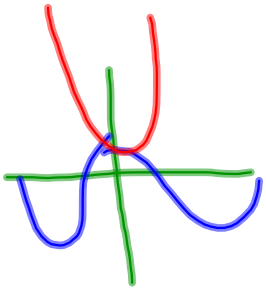
$\cos(\theta) = \frac{1}{x}$



$\text{Secant} = \frac{1}{\text{Cosine}}$

and $\text{Cosine} = \frac{\text{Adj}}{\text{Hyp}}$

then $\text{Sec} = \frac{\text{Hyp}}{\text{Adj}}$



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VII $\dfrac{1}{1+\sin^2 x}$ discontinuities?

sinch
sinh

$\operatorname{sgn}\left(\dfrac{1}{1+a^2}\right) = +1$

tanh
tanch

$\cosh(x) = \dfrac{e^x + e^{-x}}{2}$

$\sinh(x) = \dfrac{e^x - e^{-x}}{2}$

cosh

$\cosh(x)$ is the hyperbolic cosine